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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,356	06/30/2006	Stephen Arrowsmith	57,0531 US PCT	9709

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SCHLUMBERGER-DOLL RESEARCH

ATTN: INTELLECTUAL PROPERTY LAW DEPARTMENT

P.O. BOX 425045

CAMBRIDGE, MA 02142

EXAMINER

HUGHES, SCOTT A

ART UNIT

PAPER NUMBER

3663

MAIL DATE

DELIVERY MODE

02/20/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/561,356

Applicant(s)

ARROWSMITH ET AL.

Examiner

SCOTT A. HUGHES

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S5108)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 11/19/2008 have been fully considered but are moot in view of the new grounds of rejection presented below.

Applicant's argument that Brancato does not disclose evaluating microseismic events from hydrocarbon extraction activities using seismic receivers positioned in a borehole are persuasive. However, Rowe (Pure and Applied Geophysics, 159 (2002)) teaches that it is known to use receivers in a borehole to detect microseismic events induced by hydro fracturing (Pages 564-565) in a former oil field. Although Rowe does not specifically disclose that the hydro fracturing induced microseismic events are generated by hydrocarbon extraction activities, Bailey (5747750) teaches that it is well known in the field of hydrocarbon extraction (oil production from wells) to use hydraulic fracturing processes that induce microseismic events to increase production from the wells (Column 1). Therefore, it would be obvious to use the methods of Rowe in hydraulic extraction operations as a main use of hydraulic fracturing that generates microseismic events is in increasing production from hydrocarbon reservoirs.

As noted by applicant, applicant's cancellation of claim 24 has made the previous rejection under 35 USC 101 moot.

Claim Objections

Claim 14 objected to because of the following informalities: Claim 14 is labeled as being "(Original)" in the most recently submitted set of claims, but claim 14 now

includes boxes where it appears that the boxes should be variables in the equations. Appropriate correction is required. For the purposes of this action, claim 14 will be interpreted as though it includes the equation given in the previous set of claims.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites the limitation "the overall cross-correlation coefficient" in the preamble of the claim. There is insufficient antecedent basis for this limitation in the claim. Claim 3, from which claim 4 depends, recites the limitation of a correlation coefficient, but does not specify that this is a cross-correlation coefficient. For the purposes of this action, claim 4 will be interpreted as though claim 3 requires that the correlation coefficient by a cross-correlation coefficient.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-15 are rejected under 35 U.S.C. 102(a) as being obvious over Rowe (Pure and Applied Geophysics, 159 (2002)) in view of Bailey (5747750).

With regard to claim 1, Rowe discloses a method of identifying microseismic events generated by hydraulic fracturing activities in seismic data (abstract; Page 564). Rowe discloses seismic data comprising at least first seismic data traces acquired at a first seismic receiver (downhole seismometers) and second seismic data traces acquired at a second receiver (downhole seismometers) spatially separated from the first receiver (Fig. 2) (Pages 564-565). Rowe discloses positioning the first and second seismic receivers in a borehole, wherein the first and second seismic receivers are vertically separated in the borehole (Fig. 2) (Pages 565, 567). Rowe discloses determining an overall measure of similarity (correlations) for a pair of microseismic events in the seismic traces, the overall measure of similarity being indicative of the similarity between the events acquired at the first seismic receiver, and of similarity between the events acquired at the second receiver (correlation similarity matrix defined for the different events) (abstract; Page 569, Automatic Repicking Technique to Page 577). Rowe teaches that it is known to use receivers in a borehole to detect microseismic events induced by hydro fracturing (Pages 564-565) in a former oil field. Although Rowe does not specifically disclose that the hydro fracturing induced microseismic events are generated by hydrocarbon extraction activities, Bailey teaches that it is well known in the field of hydrocarbon extraction (oil production from wells) to use hydraulic fracturing processes that induce microseismic events to increase production from the wells (Column 1). Therefore, it would be obvious to use the

methods of Rowe in hydraulic extraction operations as a main use of hydraulic fracturing that generates microseismic events is in increasing production from hydrocarbon reservoirs.

With regard to claim 2, Bailey teaches that it is known to perform microseismic monitoring in real time (abstract; Column 3). It would have been obvious to modify Rowe to include real time processing as taught by Bailey in order to control the hydraulic fracturing in wellbores based on the data received.

With regard to claim 3, Rowe discloses that the overall measure of similarity is an overall correlation coefficient indicative of correlation between events acquired at the first receiver and correlation between events from the second receiver (Pages 569-572, 576-577).

With regard to claim 4, Rowe discloses that determining the overall correlation coefficient comprises determining a first correlation coefficient from the pair of events from the first data, determining a second correlation coefficient for the pair of events from the second data (different receiver), and determining the overall correlation coefficient for the pair of events from the first correlation coefficient and the second correlation coefficient (Pages 569-572, 575-577).

With regard to claim 5, Rowe discloses comparing the overall measure of similarity for the pair of events with a first predetermined threshold (Pages 569-570).

With regard to claim 6, Rowe discloses identifying the pair of events as a doublet if the overall measure of similarity is equal to or greater than the first threshold (Pages 569, 1st paragraph to 572).

With regard to claim 7, Rowe discloses that the first receiver is a multicomponent receiver (Fig. 2). Rowe discloses determining respective correlation coefficients for the pair of events for each data component acquired by the receiver, and determining the first correlation coefficient for the pair of events from the respective correlation coefficients (abstract; Page 569, Automatic Repicking Technique to Page 577).

With regard to claim 8, Rowe discloses determining coefficients in the frequency domain (Page 569-570 – processing done in frequency bands).

With regard to claim 9, Rowe discloses determining the first correlation coefficient as a weighted average of the respective coefficients (Page 569, last paragraph).

With regard to claim 10, Rowe discloses that the second receiver is a multicomponent receiver (Fig. 2). Rowe discloses determining respective correlation coefficients for the pair of events for each data component acquired by the receiver, and determining the second correlation coefficient for the pair of events from the respective correlation coefficients (abstract; Page 569, Automatic Repicking Technique to Page 577).

With regard to claim 11, Rowe discloses determining coefficients in the frequency domain (Page 569-570 – processing done in frequency bands).

With regard to claim 12, Rowe discloses determining the first correlation coefficient as a weighted average of the respective coefficients (Page 569, last paragraph).

With regard to claims 13-14, Rowe discloses determining the overall correlation coefficient as an average of the first and second correlation coefficients (569-571). Rowe discloses determining an overall coefficient based on the maximum average of a sum of correlation coefficients divided by the number of receivers (569-571).

With regard to claim 15, Rowe discloses acquiring first and second receiver data simultaneously, and processing the data according to claim 1 (Fig. 2) (a

With regard to claim 2, Rowe discloses that the method involves a real time processing method (221, 1st column).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SCOTT A. HUGHES whose telephone number is (571)272-6983. The examiner can normally be reached on M-F 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. A. H./
Examiner, Art Unit 3663

/Jack W. Keith/
Supervisory Patent Examiner, Art Unit 3663